

From *THE INTERDISCIPLINARY TEACHER'S HANDBOOK:
INTEGRATED TEACHING ACROSS THE CURRICULUM*
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Themes

What is a theme? A theme is simply a clump of stuff for study, stuff bounded by certain parameters that allow for focus. One teacher whom we know of has her students throw a hula hoop onto the desert land that surrounds their school. What exists within the bounds of the hoop is the focus of their studies. Themes are jumpstarters for creating curiosity and need, a reason to seek and apply information and skill.

We offered the shoe as an example of the kind of thematic starting point that interests us. And, as we have said before, we do not reject the broader, seemingly more academic themes like those Ackerman proposes, "humanities," "science/technology, society," and "evidence," or those Perkins (1989) sees as providing "lenses worth looking through" such as "argument and evidence," "change," "dependence and independence." These are all good principles to explore and to think about. So too James Beane's (1990) themes for early adolescents: "transitions," "identities," "interdependence," "wellness," "social structures," "independence," "conflict resolution," "commercialism," "justice," "caring," and "institutions." But we do not think that such themes are necessarily the best starting points for exploration. Rather, they are themes that are discovered along the way. "Evidence," for example, is not so much a theme to be studied directly as it is a tool for discovering truths about such things as spiders, rusty nails, shoes, the industrial revolution, nuclear power production, and religion.

Christine Pappas, Barbara Kiefer, and Linda Levstic (1990) offer "wash and wear," "changes," "let's eat," "giants," and "digging up the past" as sample themes for kindergarten through sixth grade classes. Sherri Winnett (1993) suggests the study of amusement parks. An article in *Ties* magazine (Parkhill 1993) invites the study of roller coasters, and Marriott invites students to study physics in their Great America parks. Roberts (1993) focuses on dinosaurs. Janet Northrup (1989) has students explore "fast foods," and Ann Alejandro uses "cars" as a theme (1989). Elsie Nigohosian (Wepner 1992) uses endangered species to teach social studies, science, mathematics, language arts, music, and computer skills to elementary students. Dale Andrews, a teacher at Billingshurst Middle School in Reno has developed a thematic unit centered on the building of a bicycle trail that would follow the path of the old Emigrant Trail. Lee Hurren, Marley Carlin, Nancy Wells, and Sharon Soule, once students at the University of Nevada, Reno, created a

unit on Cinco de Mayo. Another group of students, Gina Leonard, Milissa LiCon, Abigail Kirst, and Forrest Gorden wrote a unit that would have students establishing a colony on Mars. Within each of these themes, the important abstract concepts with which Perkins, Ackerman, and Beane concern themselves can be discussed.

The themes we prefer begin with something that is tangible, something that can be observed, smelled, tasted, or seen. We like these themes because we feel they lead students into and through important learning processes in a very natural way, from observation, to curiosity (questioning), to exploration, and to knowledge. This is the pattern of thoughtfulness we believe schools are obligated to help students understand, because it gives them a sense of how knowledge is made. It is, we think, the pattern that characterizes the thought processes of thinking people, of thoughtful people.

The Qualities of Good Themes

A theme is simply a focal point for study, an event, an object, an idea that evokes in students curiosity or a need to know. As such, it provokes investigation. We now present our list of the qualities of good themes. The list, we think, could also be called "qualities of good curricula," because good themes are only as good as the curricula they generate. We will say more about this later. For now, as you read through this list, consider the implications of the principles for instruction, interdisciplinary or otherwise.

1. Good themes cause students to generate interesting questions and to pose intriguing problems. They provoke curiosity. They confuse. As such, they provide reason for learning. Dale Andrews proposes to his students that they begin a project that will lead to the building of a bicycle path through Reno that will follow the route of the Emigrant Trail. Certainly the idea creates curiosity about the trail and the people who used it. Textbooks are helpful here. But in order to build a bike path that follows the original trail they need more specific information. History texts can tell them what the trail was and where it was, but in a general way. Dale knows that the trail ran through what is now Reno, but where exactly? The text will tell of events that occurred along the trail, but where will they get information telling them what took place along that portion of the trail that their bike path will cover? Once they find the route the trail took, how will they go about finding out who now owns the property? How will they obtain right-of-ways? According to Dale, students will discover that the trail's course runs directly through one of Reno's shopping malls. What will they do about it? These and a multitude of other questions will have to be answered, questions about materials and costs, amenities, maintenance, liability. If the path follows a historic route, how will that his-

tory be represented to those who use it? And who will use it? How does one go about finding out? Demographic studies?

2. The questions students raise in response to good themes provoke thought and, inevitably, thought about the thought processes, or *metacognition*. Good themes cause learners to think about things they have not thought of before, or to think about them in different ways. One of the reasons we like the idea of making the familiar curious is that it pushes students to understand the nature of their own understandings, to understand that in most instances, to varying degrees, they are partial and idiosyncratic. Thorough use of good themes causes students to consider how they know what they know, and this, in turn, leads to similar examination of perceived knowledge. A recent project at Billingshurst, a local middle school, asked students to explore the issue of water use along the Truckee River. Truckee water flows from Lake Tahoe in the Sierra Nevada mountains, through Reno, and out to Pyramid Lake and the desert farming community of Fallon, Nevada. It provides water for the cities, irrigates farmer's fields, and fills Pyramid. It is a limited resource even in the best years when there is good snowfall in the mountains. At the time the unit was used, the area was in the midst of prolonged drought. Public disputes over who should get the limited amounts of water available were hot and heavy.

At the onset of the unit, students were surveyed to find out who they believed most deserved to have Truckee water. They were then placed in teams, each of which studied the needs of a different Truckee user group. One team worked to discover all it could about the claims of the Paiutes who owned Pyramid Lake and needed water sufficient to allow the sacred Cui-ui fish to spawn. Another team studied the needs of the residents of Reno, and those of the tourists who stay at the hotel-casinos that provide the bulk of the town's revenues and most of the jobs. A third team examined the concerns of the Fallon farmers, and a fourth those of recreational users upstream whose spending sustains the economies of Sierra towns like Tahoe City and Truckee.

As the unit progressed, perceptions began to change and students were asked to monitor those changes. The views reflected in the initial surveys were affected by students' contact with the people whose lives were touched by the issues and the new information they were collecting through their research. The question of "how we knew then" as opposed to "how we know now" was discussed, not only in relation to the issue at hand, but also in regard to how this experience pertains to "knowing" at any time about any issue. Students had to concern themselves with their own taken-for-granted beliefs, with the issue of "common knowledge," and with the meaning of information as it relates to the act of making important decisions that affect the lives of real people. They knew by unit's end that the meaning of facts changes as the perceiver's attitude toward them changes. They learned the importance of knowing not only how *they* thought, but how other people think.

3. Good themes help students to discover *what they know* and *what they know*

how to do is pertinent to finding answers to questions and problems themes raise. At the same time, good themes allow students to discover that what they do not know or cannot do is also necessary for answering questions and finding solutions. This process of inventorying assets in the face of need is a prime motivator for learning. If you need something and you do not have it, you have to find a way to get it. An interesting facet of this is discovering what it is that you have to have. Ann Hoyle and her students at Easton Middle School discovered what they didn't know but needed to know to run a school bank when Douglas Porter, a local bank president, graciously invited two bank examiners to audit a banking operation run out of Hoyle's classroom. The examiners told teacher and students that the bank they were running was in violation of the laws of the Commonwealth of Massachusetts. They were operating a bank without a charter and "charging interest at a usurious rate," 418 percent a year, to be exact. The bank also did not have a license to collect loans and a cease and desist order was issued (Burnstead 1983).

The group of students at the University of Nevada who developed an interdisciplinary unit having middle schoolers build a concession stand ran into similar problems. Food storage became a problem, as did the need to find sources of initial capital. There was also the problem of finding wholesale vendors who would sell them the relatively small amounts of food items the cart would require.

4. The questions and problems posed by good themes lead to thought that eventually leads to *exploration*. Exploration or investigation become necessary when the memory and other readily accessible archives of information are found to be insufficient to provide answers and solutions to questions and problems learners face. Exploration is the process of approaching the unanswered or unsolved. Thus, a theme must have built into it enough complexity to force students to reach beyond what they already possess. Good teaching can bring out the complexities embedded in almost any theme. Good themes, and good use of themes, ensures that exploration will not be easy, that students will have to be resourceful if they are to acquire what they need. Texts and library materials can be useful, but good themes should take students into new resources beyond the school grounds, into the community, into the world, into resources that are not so nicely organized or readily available. The bank and food projects necessitated students tapping into resources they likely never knew to exist, into regulatory codes and product catalogues. The ability to reason one's way to and through resources is an extremely important life skill that is rarely practiced in schools. Familiarity with the process of finding resources is best taught, we think, in the context of finding answers to questions and problems with which one is truly concerned.

In 1991, a group of middle school students became aware of the existence of decoy ducks made by ancient Native American craftsmen of tule reed. The decoys were depicted on that year's state duck stamp. Upon seeing

the stamp, a student asked his social studies teacher, Duncan Monroe, where the decoys were. Thus began the RADD, or Recover a Duck Decoy project. The students' initial research, involving contact with the duck stamp's painter, showed that the ducks had been excavated from a cave on the Humboldt River in the 1920s, and that approximately twenty of the original ducks survive. Most, they discovered, reside at the Hayes Museum in New York City and not a single duck, the oldest decoys ever found in the Americas, remained in Nevada. The RADD project's aim was to bring some ducks home.

The students, and their teachers, discovered that the Hayes Museum had recently become a part of the Smithsonian Institution, and this, they found, meant that the decoys were now owned by the United States government. They found administrators in the Smithsonian who dealt with Native American antiquities and discovered that the actions of these administrators were overseen by a Board of Regents that included the vice president of the United States, the chief justice of the Supreme Court, members appointed by the president of the Senate and the Speaker of the House of Representatives, and others appointed by joint resolution of Congress. The best way to approach the issue, they discovered, was to contact their congressional representative, which they did, earning some a summer meeting in Washington, D.C. with members of Nevada's delegation.

Through their explorations they discovered the hierarchies of bureaucracies and government, who did and who did not have authority, and who to contact in order to get things done. Phone calls and letters to one source led to new sources who referred students to more sources. New vistas, new layers of authority, new twists on who had to be contacted, how they had to be contacted, and when they could be contacted were discovered. The students spoke to local Native Americans who knew about antiquities and the antiquities laws. They spoke to lawyers who worked with the Native Americans. They engaged anthropologists, artists, conservation groups, hunters' clubs (Ducks Unlimited had unsuccessfully been trying to have a decoy returned to Nevada for several years). They spoke to scientists of all types, including those concerned with climate and atmospheric conditions—the Smithsonian has very strict regulations regarding the care of antiquities, and Carson City, Nevada, where the decoys were to be displayed, is about 4,000 feet higher in altitude than New York City. The difference in atmospheric pressure caused by the altitude change could seriously affect the well being of ancient tule reed ducks. The northern Nevada climate is also different from New York's, and transfer of the decoys from a humid climate to a dry one could cause damage. Thus, a display case had to be built to compensate for these geographic and climatic realities. Skilled craftspeople had to be found to build a case to the scientists' specifications.

5. Good themes create a need and a desire for disciplinary and interdisciplinary skill and knowledge. Certainly the examples we have given thus far require

students to possess or to acquire skills and knowledge commonly taught through the disciplines. The bank project necessitated that students know something of how interest is computed. A project calling for the creation of a new city park requires that students be able to compute area and possess an understanding of the attributes and requirements of different types of vegetation. A project to place a colony on Mars necessitates knowledge of science, mathematics, and the social sciences. We would wager that the formula for discovering the area of a triangle could be made important in the context of this unit. So could the workings of the human cardiovascular system, and principles of physics such as gravity, fusion, and fission. History, sociology, and psychology could tell something of how the colonists might react to the conditions they would face. English, in tandem with the social sciences, might offer novels, short stories, and poems to give the planners a sense of the nature of human beings, their needs, their desires, their manner of interacting with one another. Home economics and physical education could inform the planners of the nutritional and physical conditioning needs of the settlers, and art and music could be considered in regard to the effects they have on individuals and societies.

6. Good themes cause students to seek and apply disciplinary (and interdisciplinary) knowledge and skill. Need and desire lead to action. And, conversely, action leads to need and desire. Embedded in good themes are the questions and problems that make the disciplines purposeful, and their purposefulness comes to be understood as students use disciplinary knowledge and skill to find answers and solve the problems the themes raise. When purposefulness is discovered, students grasp the value of disciplinary teachings and this creates a desire, and sometimes a need, for students to learn more about them. Application, in other words, can prove *that it works*.

During the RADD project, students in Carla Sankovitch's English class worked on writing and speaking skills. They used these skills to gain access to those who could be of help, to convince those they accessed of the righteousness of their cause, and to obtain the money they needed to pay for the ducks' flight home and the case in which they would be displayed. Even before they knew that their efforts had succeeded, they had come to realize the power of the written and spoken word. Those words brought recognition from the press, from the community, from administrators in important agencies including the Bureau of Land Management, the Smithsonian Institution, and the Nevada State Museum, and from leaders in state and national governments. They spoke to civic organizations, made their pitch to the press, met with the governor, and consulted with the state's two United States senators.

In their writing and in their speeches they had to show that they knew their stuff. To do that they had to accurately discuss history, describe events, present the science that Matt Munley helped them to understand. The Illinois Rivers Project had the same force. Robert Williams, Cindy Bidlak, and David

Winnett (1993) report that the project, as of the fall of 1993, involved a network of teams at twenty-two midwest schools, which

work to produce scientific data, to research social and cultural information, and to solve problems on its section of the [Mississippi] river. All teams are trained in project procedures, conducting water tests, using computers to transmit data on the Southern Illinois Educational Network (SOILED NET), and writing for *Meanderings* (the student-authored book). (80)

Students involved in the project have used what they have learned to, among other things, carry out a successful campaign to get the Jersey County (Illinois) health department to develop a new sewer system; help a country club discover the cause of a fish kill in a pond on its grounds and to determine the proper amounts of fertilizer to use on its greens; engage the Environmental Protection Agency, the Army Corps of Engineers, and a county conservation department to force a land owner to stop dumping waste near a stream bank; halt the dumping of raw sewage into the Illinois River through a broken sewer system by forcing the mayor and city council of Henry, Illinois, to complete in a few years clean up work that was a part of a ten-year plan. Again, as with the RADD students, the knowledge and skill learned through the disciplines was applied with inspiring results.

7. Good themes provide intellectual goals that cause learners to naturally encounter the *whys* of the disciplines. Such understanding of the purposefulness of the disciplines' contents and procedures leads to a pragmatically grounded understanding of the *hows* of the disciplines, an understanding of how their procedures work to accomplish their purposes. Further, good lessons embedded in good themes solve the problem of students simply memorizing information and algorithms. Understanding the relationship of a procedure to the problems it works to solve makes the operation or procedure *sensible*. We think it is critical that students not only learn the disciplines in the traditional sense, but that they make sense of the inner workings of the disciplines they study.

In the city park project, designed by a team of prospective teachers, Larry Marlow, the math person in the group, uses the unit as an opportunity for making the procedures for finding the area of various geometrical shapes sensible to students. There are, of course, formulas that allow one to calculate area, but students often do not understand the reasoning behind the formulas. If a park is to have lawn, the park planner must know how much sod or seed will be needed, and with a finite (and these days, a tight) budget for construction of parks, he or she must be able to determine what the cost of sod or seed will be. Marlow's plan is to take students out to a park, have them use various measuring tools to discover the area of those parts of the park covered with grass, determine the amount of sod needed to cover that area, call a turf company for an estimate, and come up with a price for a new lawn. In the unit, students also need to consider the amount of water different park designs would necessitate.

The science teacher would deal with methods for determining the porosity of various soil types, the moisture requirements of different plants, evaporation rates, and the possible watering techniques that could be used. Students would also consider the effect of climate on soils and plants, and evaporation rates, all to determine what the cost of water for the park might be. Aesthetics, in relation to expense and practicality, also need consideration.

8. Good themes naturally lead to interdisciplinary inquiry. It is difficult to imagine a real world question or problem that can be answered or solved through reference to a single discipline. Themes focus on problems rather than disciplines, thus pushing students into the realm of real-world issues. If students are seeking solutions to problems derived from interaction with the world around them, integration of disciplinary knowledge and procedure comes naturally. The shoe example shows how disciplinary procedure and content intermingle as one tries to answer questions raised by the theme. For example, in trying to understand the evolution of the athletic shoe, physiology and physics become intertwined in a most pragmatic fashion. Viewed from an economic/historical perspective, the science of machines (which includes physiological and kinesthetic observations as well as physics and engineering) intermingles with the sciences that focus on behavior, sociology and psychology. To glimpse this intertwining one can pick up a company prospectus for one of the athletic shoe manufacturers. Aspects of research and development of the product are described in terms of the impact they have on the minds of prospective buyers:

Utilization of CAD/CAM technology should reduce the time it takes to introduce new products to market by shortening the design and development stages and should enable the Company to respond more quickly to changing consumer preferences. (L.A. Gear 1993, 6)

9. Good themes build strong communities of learners. Good themes, because of their real-world complexity, cause individuals to pose unique questions and unique responses to the questions. These questions and responses are often of great interest to the group, since all members are focused on the theme and have a stake in understanding it. In this way, good themes create a learning environment in which the product of individual thoughts contributes in a visible way to the good of the community.

The social interaction a good theme can generate is crucial to the development of higher-order thinking. Piagetian scholars have argued that it is contact with the thinking of others that leads to critical thinking abilities. To think critically is, to an extent, to consider possibilities, the validity of different and sometimes opposing views and perspectives. The ability to do so, to juggle in one's mind contending possibilities, is learned through interacting with others and, in a social and external fashion, grappling with the differences that arise.

The water project described above is set up in such a way that contending views are ensured. Each group examines the claims of a different Truckee River water user group, and by project's end, decisions have to be made as to who should actually get the water. Almost all of the thematic projects we have discussed force meaningful group deliberation coupled with a need to make decisions that ultimately have "real-world" consequences. Even projects that exist in the realm of simulation, like the trip to Mars project, have the potential to create situations in which competing minds are appreciated for pushing the group mind toward the best possible answers and solutions.

10. Good themes promote what Lafer and Markert (1994) have called "cooperation in the strong sense." Cooperation is not mandated, but rather, evolves as the group pushes forth to accomplish collective ends. The agreement to disagree is central to good cooperative ventures; the refusal to disagree prevents groups from finding and selecting best possible answers. Cooperation in the strongest sense is based on the will and desire to succeed rather than based on a set of dictated behaviors advocated for the sake of politeness.

Selecting Themes

Good themes, simply put, generate questions that students are interested in having answered. They lead into exploration that creates a need for the good things the disciplines have to offer. Much of what makes a theme good is what teachers do with them, or what they encourage students to do with them. The shoe, at first appearance, has no business posing as a theme. Neither does a rusty nail. But consider again what we found in the shoe, the kinds of questions that would lead into interesting interdisciplinary and disciplinary study. The rusty nail is Aalbert Heine's point of entry into far-ranging interdisciplinary inquiry. Says Heine, former director of the Corpus Christi Museum, "just one object in the museum, a square nail, rusty and bent, is all that is needed to open up the world, to introduce the flow of knowledge" (Martinello and Cook 1994, 76). One can, starting with the nail, investigate the history of houses built in the part of the city in which the nail was found, consider the "forces that bent the nail, the kinetic force of the hammer, and the forces of friction that hold it in the lumber." The nail can lead to discussions of electromagnetics, chemistry (oxidation), geology, anthropology, astronomy ("to discuss meteoric iron and to speculate about the core of the earth"), economics, and art. For Heine, write Martinello and Cook, "the nail can be seen as the center of the universe" (76).

And so can the shoe, an old mason jar, a fossil, or an old TV set found at the dump. These are things that have, as all things do, composition, history, utility, origins, significance. And each of these aspects of their existence can be exploited for interesting study. That old mason jar, for instance, is made from silicon (the

same substance that makes computer chips possible) found in sand, which has a geological history and geographical significance. Someone, at some time, has used the jar to preserve food. To do this, a procedure was used by which air was removed from the jar to create a vacuum. Cut off from air, the food was preserved. Someone invented this process, one invention in a long line of inventions related to food storage, a most significant factor in the development and history of human civilizations. Again, how many questions can one spin by focusing on this jar? And how many problem-rich inquiry activities could be generated?

InterMusing

Take the question we just asked and come up with your answer: How many questions can one spin off the mason jar? How many problem-rich activities? Or, if you do not want to play with the jar, how about something within your field of vision at this moment? A light bulb? A radio or television? A hairbrush? Just how complex is the simple? Take a look at the ballpoint pen in your hand!

Good Themes are Everywhere

Good themes surround us. They are there for the plucking. We, as teachers, and as students, simply need to be observant and ready. Before we offer a list of categories of stuff to pluck from, we can't resist throwing in this tasty excerpt from Robert Pirsig's *Zen and the Art of Motorcycle Maintenance* (1974), not only because one of the examples below concerns buildings as beginnings, but also because it so nicely illustrates other points we have been trying to make. He is relating his alter ego Phadrus' attempt to deal with students in his English class who claim that they are unable find things to write about. "One of them," he writes,

a girl with strong-lensed glasses wanted to write a five-hundred-word essay about the United States. He was used to the sinking feeling that comes from statements like this, and suggested without disparagement that she narrow it down to just Bozeman.

When the paper came due she didn't have it and was quite upset. She had tried and tried but she just couldn't think of anything to say.

He had already discussed her with her previous instructors and they'd confirmed his impressions of her. She was serious, disciplined and hardworking, but extremely dull. Not a spark of creativity in her anywhere. Her eyes, behind the thick-lensed glasses, were the eyes of a drudge. She wasn't bluffing him, she really couldn't think of anything to say, and was upset by her inability to do as she was told.

It just stumped him. Now *he* couldn't think of anything to say. A silence occurred, and then a peculiar answer: "Narrow it down to the *main street* of Bozeman." It was a stroke of insight.

She nodded dutifully and went out. But just before her next class she came back in *real* distress, tears this time, distress that had obviously been there for a long time. She still couldn't think of anything to say, and couldn't understand why, if she couldn't think of anything about *all* of Bozeman, she should be able to think of something about one street.

He was furious. "You're not looking!" he said. A memory came back of his own dismissal from the University for having *too much* to say. For every fact there is an infinity of hypotheses. The more you *look* the more you *see*. She really wasn't looking and yet somehow didn't understand this.

He told her angrily, "Narrow it down to the *front of one* building on the main street of Bozeman. The Opera House. Start with the upper left-hand brick."

Her eyes, behind the thick-lensed glasses, opened wide.

She came in the next class with a puzzled look and handed him a five-thousand-word essay on the front of the Opera House on the main street of Bozeman, Montana. "I sat in the hamburger stand across the street," she said, "and started writing about the first brick and the second brick, and then by the third brick it all started to come and I couldn't stop. They thought I was crazy, and they kept kidding me, but here it all is. I don't understand it."

Neither did he, but on long walks through the streets of town he thought about it and concluded she was evidently stopped with the same kind of block that had paralyzed him on his first day of teaching. She was blocked because she was trying to repeat, in her writing, things she had already heard, just as on the first day he had tried to repeat things he had already decided to say. She couldn't think of anything to say about Bozeman because she couldn't recall anything she had heard worth repeating. She was strangely unaware that she could look and see *freshly* for herself, as she wrote, without primary regard for what had been said before. The narrowing down to one brick destroyed the blockage because it was so obvious she *had* to do some original and direct seeing. (70-71)

Here are some of the places where the "bricks" of thematic units can be found.

- | | |
|-------------|------------------|
| ▪ Buildings | ▪ People |
| ▪ Machines | ▪ Ideas/Concepts |
| ▪ Food | ▪ Endeavors |
| ▪ Events | ▪ Phenomena |
| ▪ Places | ▪ Issues |

FIG. 3-1 Where to Go for Good Themes

InterMusing

As we go through the categories we ask you to create lists of your own, of things within your reach, things local, that might be worthy of becoming themes for

study by your students. You may even find some of the things on your list worthwhile to study yourself. Who knows! An exploration into one of these little things could lead to something big, like an article somewhere for those who never thought to look closely at the thing themselves!

Things

We have already mentioned mason jars, rusty nails, and shoes, each of which can trigger months of interdisciplinary study. *Buildings*, as we've seen, also have potential. And they do not have to be at all elegant or prominently recognized in city tour books. We once had a conversation with a person from our local humanities committee who told us that our state was devoid of culture. No place, we argued, is cultureless. A corrugated sheet metal Quonset hut by the side of a railroad track is a cultural artifact, and, to say what is not so obvious, an engineering wonder—if you want to do a little wondering. Corrugated sheet metal is the result of cultural forces that led to the creation of sophisticated processes that utilize sophisticated machines. Someone built the structure, for some reason, and something, many things over the years perhaps, have gone on inside it. Do we know what goes on inside the building today? And by the way, who invented the Quonset hut (note that *Quonset* is capitalized), when was it invented, for what reason, and what is a Quonset? Why the corrugated design? What function do those ripples serve? What kind of culture does the building represent and what does its aesthetic quality say about our culture? Our city? The area in which it is found?

A student of ours, Christine Bates, not too long ago took off on a wonderful exploration into a now-shuttered hotel building that sits on a prime piece of the riverfront at the heart of Reno's casino district. Beginning with current controversies over the building's future, she traced her way back to the original owners and the development of their grand design, and forward to the hotel's closing day. From her findings she wrote a play with characters the likes of Marilyn Monroe and Arthur Miller, who stayed in the hotel, and Sammy Davis, who played the "Skyroom" for years but couldn't stay at the hotel because it was outside Reno's "Negro" lodging area. She had to see *The Misfits*. She viewed blueprints and spoke with structural engineers. She consulted with lawyers, with the building's newest owners and with friends and family of the original owners. She spoke with those who were campaigning to tear down the Mapes and with those who wanted it saved. There are buildings everywhere worthy of study, be they the Pentagon or an abandoned shack on the corner of Fifth and Main.

Machines are another rich category of things from which to pull themes. Ann Alejandro of Southwest Texas Junior College designed a "Culturally Integrated 'I-Search' Module" using the automobile as a *vehicle* for exploring human behavior and American culture (1989, 41). Neil Wangsgard, Jack Barrett, and Bernice Servilican, members of an interdisciplinary team at Billingshurst Middle School in Reno, also used the car as a focal point for a unit. Students were placed in groups, each of which adopted a particular era in American history and an automobile

or group of automobiles from Harrah's Automobile Museum. By unit's end, students had created dioramas depicting their era for display in the museum.

An article in the local paper described an earth-moving machine's visit to a local elementary school. According to the article, students were absolutely fascinated by the huge yellow tractor. It isn't difficult to conceive of earthmover-inspired units that could include lessons touching on ecology, geology, physics, engineering, ethics, and more for students at any grade level. A visit to a manufacturing plant of almost any kind can produce the same kind of fascination and the same kind of opportunities for teaching numerous disciplinary concepts. And there are smaller machines, in businesses, in entertainment centers, and in schools. How does a video machine work and how are videotapes made—the technical and the theatrical aspects? Certainly there are computers to study and there are machines to invent for the colonists on Mars, for dealing with the water problems in the Truckee Meadows or in Iowa City, and for feeding and watering the gerbils automatically over summer break.

Civil engineering projects and infrastructure have great potential for generating themes. The theme of "dams" opens the floodgates for wonderful things to study and learn by, as can the systems that deliver useful commodities such as water, gas, and electricity to our homes. How does water get to the faucet, and what happens to it after it goes down the drain? Who maintains these systems, and what are the consequences of the way in which we treat the waste? What are the consequences of taking water from rivers and the ground? Consider where study of the power grid can take us. Some of us end up in coal mines considering the animals (and perhaps the humans) that died to produce this fossil fuel. Some of us have to look at the rivers and streams whose energy has been harnessed to turn the turbines. Others have to deal with the realities of nuclear power production.

Streets and highways offer a source of fascinating study. Consider what can be learned once one begins to ask questions of the roads that run through every city and town. Where do they go? What are the places they touch in terms of the people who live there, the geography, the climate, industries, events, history? What are the road surfaces made of and why? Are the same materials used along the entire route, or are different types of materials used in different places? Why? How were the highways built, who built them, and when? Who paid for them and how? Has the road changed over the years? How so? Why? Have changes in the road caused changes for the towns and cities along the route? And, of course, there are metaphorical roads and metaphorical dams, and all are tied into political systems and processes, human debate and deliberation, and universal principles that govern the physical world and its creatures.

Food is another tasty area for interdisciplinary exploration. Units on nutritional needs lead into studies of geography, history, human tragedy, invention, ecology, chemistry (the chemical make-up of foods as well as the chemical additives in foods, pesticides, weed killers, etc.), machines, irrigation systems (back to the rivers and streams), techniques of food preservation, food processing, and the marketing

of food, the latter leading one into the supermarket and the worlds of merchandising and advertising. Dissect a Twinkie and consider all it represents, from production through its nutritional and sociological implications. All of this regards food for humans. Study food chains and the consequences of tampering with them. Different animals have different nutritional requirements and different digestive systems to accommodate their diets. Their diets have much to do with habitat, with the lives they live, and with the creatures who share their niches. Food can encompass the study of restaurants, food carts, and politics. Study the social service agencies that deal exclusively with food, food stamps and WIC. Study the stories and histories of gatherers, growers, hunters, and producers. *The Grapes of Wrath* has much to do with food production in the United States, and so does the classic television documentary *Harvest of Shame*.

On a summer's day in 1993 the people of Ely, Nevada, and surrounding towns gathered to witness the demolition of the Kendicott smokestack. The fall of the structure had symbolic meaning for those towns. It was another sign of a declining economy, the end, perhaps, of the era in which copper mining was the primary source of jobs in the area. On that day one great demolition feat would reduce the product of a great engineering feat to rubble. The tower, used for some aspect of the copper production process, would fall into itself rather than over. The explosives experts had some tricks at hand that would pretty much ensure that the stones and concrete would fall into a heap and spare the homes that would be crushed if the tower were to fall, in a piece or pieces, in their direction. So what was the purpose of the tower? What was the process that turned raw ore into pure copper? What is copper, and what is it for? What was, is, and will be the role of copper in the lives of the people of the area? Not too far from the site of the tower that was, abutting the tiny company town of Ruth, is one of the largest human-made pits in the world. From this pit was extracted the ore, some of which was treated by the process in which the stack was involved. There is talk of opening the pit again. Some are delighted by the prospect, perhaps most of the residents of the area. And there are some, including an environmental science professor from the University of Nevada, who warn that further digging is likely to affect the aquifer from which Ely residents draw their water supply. A political battle involving local, state, and federal officials as well as the mining company that wants to reopen the pit can tell much about how these entities intermingle, how environmental law is made and enforced, the rights of mining companies under the present mining law, the fight to change that law, the original rationale for that law, and the consequences of it remaining in place or being changed, for Ely, for the nation. By considering the who, what, when, where, why, and how of the Ely stack, every discipline is given access to a rich vein of study. Is the fall of the stack symbolic of the end or the beginning? And what might either mean for Ely and its environs?

Events like the grand demolition do not happen every day, but grand events, or events with less grandeur, do take place on a daily basis, and there is no reason to avoid taking on events of the past. There are holidays, fairs, elections and inaugurations, deaths and births, stock market crashes and resurrections, sports events.

(We have two interdisciplinary units in hand, one by a group of students at our university, the other by Susan Yeager [1988], that use the Olympic Games [now every two years] as an entry point of interdisciplinary study. Consider the disciplinary material that can be showcased under this theme! The students' unit includes a culminating project involving the development of an Olympics for the school and community.) There are concerts, space flights and plane crashes, celebrations and protests, battles won and battles lost, murders and trials, crimes and pursuits, the opening of films, the release of a new video, a television documentary, a scientific breakthrough, a scientific problem, a new business comes to town, an old business leaves, a road is opened, a flood hits town, an earthquake rumbles through Los Angeles, a hurricane ravages Florida.

Almost any event can be tapped for study. In the last two years or so Steven Spielberg has offered teachers from elementary school through college a feast of movie events rich for nourishing the interdisciplinary appetite. *Jurassic Park* put dinosaurs on everyone's mind, as well as chaos theory, gene splicing, and the negative as well as the positive potential of technology, especially computers. *Schindler's List* almost became a historical event unto itself, focusing most of the nation on the Holocaust. Spielberg made *Schindler's List* available to schools, and many took advantage of its great teaching potential. The showing of the film, or the showing of numerous other films, can be used as an event to spark interdisciplinary exploration. Books too can be made into events that lead into interdisciplinary explorations.

People, famous, infamous, and not so famous, make good starting points for interdisciplinary study. In one Nevada town a man who had been principal at the high school for thirty years was about to retire. At 70 years old and a 60-year resident of the town, a "this is your life" project could have put a truly human face on the world this man experienced and knew of, a study that could have consumed the content and processes of all of the disciplines.

Oral history projects such as Foxfire and Marian Mohr's Snake Bank to Spring Hill projects focus on the lives of residents of the communities in which the projects take place. Students learn the art of interview, familiarize themselves with the diversity of their communities and the riches diversity has to offer, come to know many adult citizens and appreciate the relationships of individual to community and community to individual. Within the context of an oral history project all disciplines can be touched upon by finding individuals whose vocations and avocations cause them to have knowledge of disciplinary concepts.

The famous and the infamous of local or more global notoriety can easily launch fascinating interdisciplinary study. In the Reno area we have several local "celebrities," some alive, some gone. There are the founders of the city's older casinos, their names made famous by the bright lights that still spell out their names on the businesses they founded, Harrah's and Harold's. There are those who made their fortunes by striking gold in the Virginia City mines, the inventors who developed the procedures for shoring the mine shafts and for extracting gold ore from the dirt, not to mention a Virginia City newspaper man by the name of Mark Twain. There are the people behind the names of our schools. One of the new schools in

the area is named Sarah Winnemucca Elementary. Sarah Winnemucca was a nationally known leader of the Paiute people and persistent advocate of good education for Paiute children. And then, of course, there is Jessie Reno.

There are explorers to explore, artists, artisans, perpetrators and victims; survivors, scoundrels and saints, empire builders and managers, engineers and architects. Who designed the Hoover Dam? Who built it? There are business leaders and business regulators, chiefs of industry and those who work in industry. What does it mean to be the CEO of Harrah's or Harold's? What does it mean to be a manager or worker in those buildings?

Ideas, concepts, issues, and endeavors, big and small, can be used as themes. We have already alluded elsewhere to some of them. Knowledge itself can serve as a theme for interdisciplinary study. Tchudi and Lafer once taught a course titled "Knowing the Unknown" (1993) that explored how it is that we come to know what we say we know, and what it is that we *have* when we do know. "Science," or "history," can, in and of themselves, serve as themes to be explored. The question of what science is leads one to inquire about the history, processes, and imperfections of science; the nature of scientific reasoning; the people of science; treatment and use of science; the consequences and implications of science; the relationship of science to other areas of endeavor such as art and literature (science fiction, for example); and the future of science. Among the themes Tchudi and Mitchell list in *Explorations in the Teaching of English* (1989) are "loneliness and alienation," "maturity and mortality," violence in America, "new journalism," "our town," "innocence and experience," "surviving," "gods and goddesses," "ambiguities," "police stories," and "literature from prisons." These themes have great expansive potential.

Amusement parks qualify as *places*, as does the piece of ground encircled by the hula hoop thrown onto the desert. The Quonset hut, the city park, the boarded hotel, the river, the opera house that provided the brick for Persig's student's contemplation—all are potentially viable thematic material. All places have a history and a form that has much to do with natural forces and some with human endeavor. There are whole cities, individual neighborhoods, and neighborhood ponds. A school itself can be made the subject of study; it sits on a piece of land that was home to something other than a school at one time; someone decided to build it, name it, open it on a particular day on which there must have been some kind of celebration. The school and the community were the focus of a kindergarten through sixth grade interdisciplinary project used at Brown Elementary School in Reno. There are distant planets and colonies, utopias and dystopias, places of geologic and geographical significance, homes, business buildings, hotels, parks, museums, caves, forests, lakes, tide pools, and even empty lots that might be of interest.

Last in our list is a category we will simply call *phenomena*. Some we have mentioned already, such as earthquakes and hurricanes. Weather in our area has much to do with how people here live their lives. There isn't much agriculture in our part of the world because the climate is so dry. The dryness is due to something called a "rain shadow." We have also been experiencing another phenome-

non known as drought for about the last seven years. In past years we have heard of cases of the plague caused by fleas that travel on fur of rodents, and recently we have been warned about the deer mice that are carrying germs that cause something called a Hantavirus. There are varieties of the flu that visit us from year to year, historical plagues, famines, extinctions, meteors crashing into Jupiter, comets, climatic changes, the Big Bang.

Choosing from Among

We seem to have said that just about anything can become a theme. They're there for the plucking. But we do think some care needs to be taken in that plucking. Certainly different themes will appeal more to children of particular ages. Up to a point, that is. Most any theme can be made relevant and exciting for most children. The "evidence" theme suggested by Perkins (Jacobs 1989) at first glance is a theme for older students, students of middle or high school age. However, the concept of evidence embedded in a dinosaur theme could be made interesting and understandable for much younger children. Patricia Roberts (1993) in her book-length description of a dinosaur unit offers numerous dinosaur books for children in all grades and suggests activities that encourage students to "chart what is based on observations and what is based on conjecture" (42). These activities come close to being lessons about evidence.

We have already positioned ourselves as favoring themes that emerge from the readily observable and allowing the more abstract to arise from the study of the tangible. Themes most certainly can emanate from books, or films, or other second- or thirdhand sources. But we favor those that allow students firsthand access. Thus, we are advocates of teaching that begins with local themes, the study of the nearby. The Truckee River Project, which we mentioned before, takes its name from the river that runs through our town. The river is within walking distance of our classroom and we can, and have, during the course, travelled from one end of it to the other. We can dip our feet in the subject of our study. Our focus on *our* river does not stop us from discussing the Owens River and Mono Lake and the diversion of their waters to Los Angeles or the floods on the Mississippi and Ohio. Our local focus helped us to make better sense of the works of John Wesley Powell and the "hydraulic" society Mark Reisner discusses in his book *Cadillac Desert* (1986).

Learning the Territory: Advancework

Knowing what is *nearby* for students is a critical aspect of making themes work. When we speak of the local, understand that we are not restricting experience to that which is strictly of the locale. A unit on kites, such as the one described in Vars (1987, see above) is made local by the fact that students are familiar with kites, have flown kites, and can build and fly kites during the unit. So too with a unit based on the Lego-Logo project described in Chapter 2. At one point, as an extension of the

original Lego-Logo project, Lafer worked with a fourth grade teacher to develop a unit that began with the building of Lego-Logo machines and moved to the study of simple machines and the physical principles upon which they operate. The unit then had students examine the nature of work, work as it relates to different geographical locations, the relationship of culture to work, and work to the topography of various regions of the world. During the unit students looked into family histories to see what countries they or their ancestors may have come from and to inquire into the work and the tools of labor their predecessors may have employed. They read maps, wrote letters, did interviews. The Lego-Logo experience led into and served as a reference point for a unit on the theme of work and culture.

The benefits of a theme having local roots can also be accrued if themes are attached to that which is timely. As this book was being written, both Richard Nixon and Jacqueline Onassis died. They were both figures of a past most of our students are too young to have experienced. But their deaths are in the present, and there are commemorations on the television, in newspapers, in magazines, and retrospectives through all media channels. Richard Nixon and Jacqueline Onassis have, in effect, *localized* portions of the past and caused questions to be raised anew about the consequences of the past on the present. Probes into the public and private lives of currently active politicians and celebrities are being discussed as they relate to press treatment of Richard Nixon and John Kennedy. Hillary Clinton's behavior as first lady is compared to that of Mrs. Onassis, as is the treatment of each by the press and the public. Today's news stories can be used to localize the past. The recent election of Nelson Mandela can easily be used to take students into the history of the Civil Rights movement in the United States, into the study of racism as it existed then so that it can better be understood as it exists now. The naming of Sarah Winnemucca Elementary School offered a good excuse to explore the history of indigenous peoples of our area and, for that matter, the history of indigenous peoples in the United States, Africa, India, and anywhere else that colonization has taken place.

ADVANCEWORK Effective *localizing* depends upon one knowing those for whom they are localizing. To this end, we finish this chapter with a discussion of what we will call *advancework*, a term we have borrowed from Friedberg and Driscoll (1992). Advancework calls upon teachers to engage in scouting missions to find out what is close by physically, in terms of relevance, in terms of timeliness. During this mission, one explores and records impressions of the terrain and comes to an understanding of the significant landmarks in the culture of the student. The shoe, for example, is for many students a significant cultural landmark. It is an item with attachments to status and group membership, heroes and dreams, the economics of childhood and adolescence. Discussion of shoes can tell us much about who students are, how they think, how they see themselves, and what influences their thinking.

For the sake of convenience, we divide the region to be explored during advancework into two territories, one the world of the mind—the inner terri-

- Consider the concepts you (and your colleagues, if you are a part of a team) wish to teach and/or are mandated to teach.
- Find local manifestations of the concepts, principles, ideas, content, etc., that you intend to teach.
- Consider the kinds of experiences students can have with these local manifestations that will allow them to become involved with or curious about the concepts the disciplines you are to teach. *Cause* the experiences to cause students to ask questions that the disciplinary teaching will answer.
- Engage students in these experiences, facilitate the question-asking, and provide the means or guidance necessary for them to find the answers they need.

FIG. 3-2 *Considerations in Making Thematic Decisions*

tory, the other the physical world—the outer territories. The inner region includes such aspects of students' lives as their emotions, feelings, thoughts, fears, and dreams, the psychological manifestations of their relationships, aspirations, and preferences, and their sense of self in relation to family, community, school, and the larger world. The outer category includes people, places, and things outside themselves.

Of the Inner Kind Advance work related to the inner world is centered on getting to know who students are. This may be accomplished through observation of students operating in *their world* with friends, in the hall, at the mall, at ball games and dances, before or after class in the classroom, and through discussion with students about their feelings and attitudes toward that world and the other realms they visit and of which they are aware. Student writing is another avenue. An assignment to play *Dear Abby* to Juliet can reveal much about the student's sense of relationships and life on the emotional plane. Surveys and questionnaires are also helpful and information obtained need not pertain only to those being surveyed. Much can be learned about the way in which they respond to the world in the questions students design for peers and adults. Interview activities can be designed to capture perceptions and feelings, and again, as much can be learned by looking at the interviewer as by examining the responses of the interviewee. What one wants to know about others can tell much about who he or she is. Many teachers we know use beginning-of-the-year interview activities, not only to open a window on students' inner sanctum, but as a way of allowing students to get to know one another so that the foundation for a classroom community can be laid. We like the idea of having students work through the interview process to develop character sketches of their classmates. Students, working individually or in small groups, are asked to find questions that they feel can elicit useful information about their classmates. The questions are then discussed by the class in terms of their potential for getting at what

needs to be known. Each student then takes from the pool of good questions those he or she wishes to ask of another and carries out an interview. The interview data is then used to create a character sketch for presentation to the class. This is not only a good way of getting to know each other, but a gentle way of introducing meaningful aspects of the exploration process, the development of good questions, interview, assessment of data, and presentation.

Surveys and questionnaires can also be used and students need not be at the receiving end of these instruments. The questions they find important to ask of others, as we've said before, tells us much about who they are, what they consider important, how they perceive themselves and others and the world in which they live. Questionnaires designed for use with students' friends, family, teachers, and other significant others can tell us much about who they know and who influences them. At Silver Lake Elementary School, a teacher, Lucy Boersma, and one of the authors developed an interdisciplinary unit on work and machines. The unit was concerned with the kinds of work people do in different parts of the world. One of the initial activities was to ask students to collect information about their family origins, to find where their ancestors had lived and the kind of work they did. To do this, students developed interviews for their parents and questionnaires to send to relatives who lived at a distance. In doing this, students learned as much about their families as we learned about them. We know too that parents and children learned more about one another through the interaction the exercise demanded. This information about the families of the students came to us as a residual of our attempt to have students look at the relationship of the geological, geographical, and meteorological features of a region to the kind of work people did in various places and the relationship of customs and traditions to place and work.

Beyond actual classroom encounters with the students who populate our classrooms, much can be learned about the lives of students of various ages through books written for and about them and by viewing the television programs produced for their edification. The advertisements aimed in their direction are also telling, as are the many newspaper and magazine articles written about children and kid culture. Scout, Atticus Finch's daughter in *To Kill A Mockingbird*, tells us much about how children see and respond to the world. *Catcher in the Rye* provides insight into the mind of the adolescent, as does the writing of such authors as Paul Zindel, Judy Blume, and S.E. Hinton; films like the *Karate Kid*, *Rebel Without a Cause*, *Romeo and Juliet* (and *West Side Story*), *Grease*, and *Wayne's World*; TV shows like *Roseanne*, *Beavis and Butthead*, *Ren and Stimpy*; and the writings of Piaget, Erikson, and Bruner.

The knowledge derived from advancework of the innerbeing can generate a host of themes such as "family," "friendship," and "acceptance and rejection." Or it can be used to help students recognize the human dimensions of more concrete themes. For example, our discussion of the shoe as a theme touched upon the effects of mechanization on communities. We have reason to believe, from our own encounters with the media, journals, and school teachers, that many students are concerned with the stability of their parents' employment, or are (or have

been) affected in significant ways by changes in their parents' work lives. A look at mechanization and its consequences for Lynn, Massachusetts, in the years 1780-1860 can have great contemporary relevance if the link is made. It may provide answers to questions students have about their own feelings, and their own feelings may cause them to feel empathy for the people who lost jobs in Lynn or are losing jobs today in Reno or Newark. Ultimately, the link may provide an answer to the question of why we study history or read literature!

Of the Outer Kind Advancework of the outer kind causes one to explore the physical, social, and economic trappings of the world in which students live. Once again, for news of the broader kind, there are newspapers, magazines, films, and television reports. But what we are asking you to do is to actually get out into the immediate neighborhood to see the things that make up your students' surroundings, the things with which they are familiar and the things nearby with which they are not familiar. Scoping out the local is a good excuse for a working vacation, an opportunity to scout out, drop in, ask a question or two about some of the places you pass by and never visit. Walk or drive the streets, read community newspapers and flyers. Read the signs in the store windows. In Quincy, California, almost every store displays a red ribbon symbol. Without too much prying, one finds that the ribbon indicates solidarity with those fighting to save the area's timber industry. This tells you much about what is important in that community.

Find the local utilities and discover what they have to offer. Our power company is also our water company and there are people in its employ who hold great amounts of information about the region. Scout the neighborhood for ponds and streams, well-worn trees and interesting homes. Notice the businesses and know what they do. Familiarize yourself with their services, and, if you are curious, ask for a tour. Use your credentials as a teacher to explain the nature of your mission and see if you can get permission to see the back rooms. Take a look at the people and chat. And don't forget to thumb through the yellow pages. Much can be learned from almost any section. If you find a long list of Lagomarsinos in the white pages, it might be worth your while to find out who they might be. In Flagstaff, Arizona, there are an awful lot of Babbitts, and many businesses bearing that name. Who are these people?

The yellow pages are a fascinating resource with an incredible amount of information for those willing to take the time. Scan the subject index and land on any category of business that catches your eye. *Disabled services* strikes us as one that might have value for classroom studies and projects. *Forgings* makes me curious, as does *bee keepers' supplies*. *Puppets*, *parachutes*, and *railroad companies* all hold promise. There is a listing for *historical places* for *architects*, *automation consultants*, and *labor organizations*. How about *patent searchers* or *sculptors*? When we "let our fingers do the walking" we noticed three businesses of particular interest to us. One was Savage and Sons Plumbing and Heating. The top of its advertisement reads "Serving the Reno Area Since 1893." We figured that Savage and Sons would know a lot about important aspects of Reno's infrastructure. We called to find out

if anyone would be willing to talk to us about history and received a positive response. The same thing happened with Commercial Hardware, a 91-year-old family-owned business. A call to the store led to an open invitation to meet with family members who knew the history of the business as well as much of the history of the Reno area. Another business of interest in our area is a restaurant called Louis' Basque Corner, not only because of the Basque cuisine it serves, but because it is one of the many Basque eateries with boardinghouses above them. A read of Robert Laxalt's *Children of the Holy Ghost* (1992) tells us that these hostelrys served the immigrant Basque shepherds who came to Nevada many years ago.

InterMusing

This is your invitation to hit the streets. For the sake of better teaching, go to a place or event that you have been curious about, could become curious about, want to know more about. Just go! Consider what you might want to know about the place or the event and be ready to ask questions. Remember, you are on a mission for the sake of better education. Take advantage of your credentials and go where others are not allowed to go, ask the questions no one else has the opportunity to ask. Suggestions: Walk along the highway, under a bridge, along a stream bank or the railroad tracks. Walk into a bar (a friend of ours has taken a job as a waitress in a bowling alley to learn more about the town in which she now teaches), onto a farm, a ranch, an ag-supply store, into a grain elevator, onto a giant road-building machine, into a quarry or mine, an equipment rental yard, a cement factory, a mushroom farm, a hospital. Scan the phone book or look in a business directory. Take notes and consider how you might use what you have found in your classroom.

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